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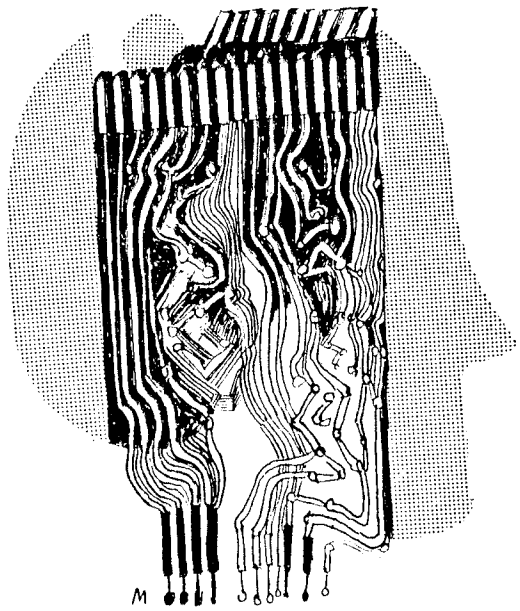

Mind, Brain, and Humanist Values

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Any mixing of values and science is a red flag in some quarters. Value judgments, we are told, lie outside the realm of science. Values are for popes and prophets, for philosophers and perhaps scout leaders and civic planners, but not for science or scientists. As a student of brain and behavior, I have never quite been able to accept this. It seems like saying that value judgments lie outside the realm of knowledge and understanding, or that the best method of applying the human brain to problems of understanding must be discarded when it comes to values. It is like saying that science is able to deal only with those phenomena that appeared prior to the emergence of higher brains, with their wants, needs, and other goal-directed properties and, of course, the corresponding value systems that these latter impose.

Values have natural and logical origins. They are interdependent and interrelated in logical, hierarchical systems. These value systems and their perturbations ought to be subject to study, analysis, and prediction—and perhaps even some experimentation on a model basis these days, with computer assistance.

• *HUMANIST IMPACTS OF BEHAVIORAL SCIENCE*

We turn to our main topic now to consider some of the major impacts on human values that stem from recent developments in the sciences that deal with mind and brain. At first glance the record achieved by the brain-behavior sciences during the past half century must appear, to the humanist, to read less like a list of contributions and advancements than like a list of moral offenses and major setbacks. The accusations that anti-science can raise in this area are not exactly trivial. For example, prior to science, man had reason to believe that he possessed a mind that was potent and replete with something called consciousness. Modern experimental objective psychology and the neurosciences in general would dispense not only with the conscious mind but also with most other spiritual components in human nature. Before science man used to think himself a free agent possessing free will. Science gives us, instead, causal determinism wherein our every act is seen to follow inevitably from preceding patterns of brain excitation. Where we used to see purpose and meaning in human behavior, science now shows us a complex biophysical machine composed entirely of material elements, all of which obey inexorably the universal laws of physics and chemistry.

Science, abetted by Freud with an assist from astrophysics, stands accused of depriving the thinking man of his Father in heaven, along with heaven itself. Man's inner nature and his heritage also seem to have fared poorly. Since Darwin, and again Freud, man now enters this life, not "trailing clouds of glory" and divinity but clouds of jungleism and bestiality with a predisposition to oedipal and other complexes. The veneer of civilization is seen to be superficial, and when it rubs thin or cracks the basic animal within quickly shows.

In the face of these and related onslaughts of science on the worth and meaning of human nature and existence, one can understand why humanist thinkers look for other roads to truth. For the scientist himself, the current dim picture puts a rather severe test to his credo that it is better to know and live by the truth, however ugly, than by false premises and illusory values.

I find that my own conceptual working model of the brain leads to inferences that are in direct disagreement with many of the foregoing; especially I must take issue

with that whole general materialistic-reductionistic conception of human nature and mind that seems to emerge from the currently prevailing objective analytic approach in the brain-behavior sciences. When we are led to favor the implications of modern materialism in opposition to older, more idealistic values in these and related matters, I suspect that science may have sold society and itself a somewhat questionable bill of goods.

• *THE NATURE OF CONSCIOUSNESS: THE CENTRAL ISSUE*

Most of the disagreements I refer to relate to a central point of controversy that comes out of the following question: Is it possible, in theory or in principle, to construct a complete, objective explanatory model of brain function without including consciousness and mental phenomena in the causal sequence?

If the prevailing view in neuroscience is correct—that consciousness and mental forces in general must be excluded from any objective model—then we write off all that inner subjective world from science and come out with materialism and all its implications. Conversely, if it should prove true, when the facts are in, that conscious mental forces do in fact govern and direct the nerve-impulse traffic and other biochemical and biophysical events in the brain and, hence, do have to be included as important features in the objective chain of control, we then come out on the side of mentalism, and with quite a different and more idealistic set of values.

Some 99.9 per cent of those of us who work in brain research have held firmly during the past fifty years to the conviction that conscious mental forces have no place in any explanatory model or theory of brain function. The inner sensations, feelings, percepts, concepts, mental images, and the like cannot be weighed or measured, photographed, spectrographed, or chromatographed, or otherwise recorded or dealt with objectively by any known scientific methodology. The dictates of the scientific method, requiring experimental demonstration and proof, demand that these introspective, private, inaccessible, will-o'-the-wisp unknowns must be excluded from any scientific explanation. Furthermore, the neuroscientist of today feels he has a pretty fair idea anyway about the kinds of things that excite and fire the cellular elements of the brain: membrane changes, ion flow, chemical transmitters, pre-synaptic and post-synaptic potentials, and the like may be on his list of acceptable causal influences, but not consciousness.

Science can see the brain as a complex electrochemical communications network full of nerve excitations, all governed by respectable scientific laws of biophysics, biochemistry, and physiology; but few investigators, and none that I know, have been ready to tolerate an interjection into this causal machinery of any mental or conscious forces. This then in brief is the general stance of modern science out of which has come today's prevailing objective, mechanistic, materialistic, behavioristic, reductionistic, fatalistic view of the nature of mind and psyche. This kind of thinking is not confined to our laboratories and classrooms, of course. It leaks and spreads, and though never officially imposed on the societies of our Western world, we nevertheless see, on all sides, the pervasive influence of creeping materialism.

• *AN ALTERNATIVE MENTALIST POSITION*

I am going to align myself in a counterstand, along with that approximately 0.1 per cent mentalist minority, in support of a hypothetical brain model in which consciousness and mental forces generally are given their due representation as important features in the chain of control. These appear as active operational forces and dynamic properties that interact with and upon the physiological machinery. Any model or description that leaves out conscious forces, according to this view, is bound to be pretty sadly incomplete and unsatisfactory. The conscious mind in this scheme, far from being put aside and dispensed with as an "inconsequential by-product," "epiphenomenon," or "inner aspect," as is the customary treatment these days, gets located, instead, front and center, directly in the midst of the causal interplay of cerebral mechanisms.

Mental forces in this particular scheme are put in the driver's seat, as it were. They give the orders and they push and haul around the physiology and physicochemical processes as much as or more than the latter control them. This is a scheme that puts mind back in its old post, over matter, in a sense—not under, outside, or beside it. It's a scheme that idealizes ideas and ideals over physico-chemical interactions, nerve impulse traffic—or DNA. It's a brain model in which conscious, mental, psychic forces are recognized to be the crowning achievement of some five hundred million years or more of evolution.

Let us now examine more closely this seemingly ridiculous notion, this "water-on-the-brain" contention that ideas and other mental entities push around, control, and direct the biophysical and biochemical events in the nervous system. The basic reasoning is simple: First, we contend that conscious or mental phenomena are dynamic, emergent, pattern (or configurational) properties of the living brain in action—a point accepted by many, including some of the more tough-minded brain researchers. Second, the argument goes a critical step further, and insists that these emergent pattern properties in the brain have causal control potency —just as they do elsewhere in the universe. And there we have the answer to the age-old enigma of consciousness.

To put it very simply, it becomes a question largely of who pushes whom around in the population of causal forces that occupy the cranium. There exists within the human cranium a whole world of diverse causal forces; what is more, there are forces within forces within forces, as in no other cubic half-foot of universe that we

know. At the lowermost levels in this system are those local aggregates of subnuclear particles confined within the neutrons and protons of their respective atomic nuclei. These individuals, of course, don't have very much to say about what goes on in the affairs of the brain. Like the atomic nucleus and its associated electrons, the subnuclear and other atomic elements are "molecule-bound" for the most part, and get hauled and pushed around by the larger spatial and configurational forces of the whole molecule.

Similarly the molecular elements in the brain are themselves pretty well bound up, moved, and ordered about by the enveloping properties of the cells within which they are located. Along with their internal atomic and subnuclear parts, the brain molecules are obliged to submit to a course of activity in time and space that is determined very largely by the overall dynamic and spatial properties of the whole brain cell as an entity. Even the brain cells, however, with their long fibers and impulse conducting elements, do not have very much to say either about when or in what time pattern, for example, they are going to fire their messages. The firing orders come from a higher command.

• *THE MENTAL ENTITIES*

The flow and the timing of impulse traffic through any cell, or nucleus of cells, in the brain is governed very largely by the overall encompassing properties of the whole cerebral circuit system, and also by the relationship of this system to other circuit systems. Even the circuit properties of the cerebral system as a whole, and the way in which these govern the flow pattern of impulse traffic throughout—that is, the circuit properties of the whole brain—may undergo radical and widespread changes with just the flick of a cerebral facilitatory "set." This set is a shifting pattern of central excitation that will open or prime one group of circuit pathways while at the same time closing, repressing, or inhibiting endless other circuit potentialities. Such changes of set are involved in a "shift of attention," "a turn of thought," "a change of feeling," or "a new insight," etc. In short, if one climbs upward through the chain of command within the brain, one finds at the very top those overall organizational forces and dynamic properties of the large patterns of cerebral excitation that constitute the mental or psychic phenomena.

Let us now illustrate one of these "power-packed" mental entities. For simplicity, consider an elemental subjective sensation—and for reasons that will become evident let us use the sensation of pain instead of philosophy's old favorite, the color red. More specifically, make it pain in the wrist and fingers of the left hand of an arm that was amputated above the elbow some months previously. Suffering caused by pain localized in a phantom limb is no easier to bear than if the limb were still there. It is easier, however, with this example, to infer where our conscious awareness must reside.

With regard to this conscious sensation of pain, the contention is that any groans it may evoke—and any other response measures the patient may take as a result of the pain sensation—are indeed caused, not by the biophysics, chemistry, or physiology of the cerebral nerve impulses as such, but by the pain quality, the pain property, per se. This brings us to the real crux of the argument. Nerve excitations are just as common to pleasure, of course, as to pain, or any other sensation. What is critical is the unique patterning of cerebral excitation that produces pain instead of something else. It is the overall functional property of this pain pattern that is critical in the causal sequence of brain affairs. This pattern has a dynamic entity, the qualitative effect of which must be conceived functionally and operationally, and in terms of its impact on a living, unanesthetized cerebral system. This overall pattern effect in brain dynamics is the pain quality of inner experience.

Above simple pain and other elemental sensations in brain dynamics, we find, of course, the more complex but equally potent forces of perception, emotion, reason, belief, insight, judgment, and cognition. In the onward flow of conscious brain states, one state calling up the next, these are the kinds of dynamic entities that call the plays. It is exactly these encompassing mental forces that direct and govern the inner flow patterns of impulse traffic, including their physiological, electro-chemical, atomic, subatomic, and subnuclear details. It is important to remember in this connection that all of the simpler, more primitive, elemental forces remain present and operative; none has been cancelled. These lower-level forces and properties, however, have been superseded in successive steps, encompassed or enveloped as it were, by those forces of increasingly complex organizational entities. For the transmission of nerve impulses, all of the usual electrical, chemical, and physiological laws apply, of course, at the level of cell, fiber, and synoptic junction. Proper function in the uppermost levels depends to a large extent upon normal operation at the subsidiary levels. It is a special characteristic of these larger functional patterns in the brain, however, that they have a coherence and organization that enables them to carry on orderly function in the presence of considerable disruptive damage in the lower-level components.

• *IDEAS AS CAUSAL FORCES*

Near the apex of this compound command system in the brain we find ideas. In the brain model proposed here, the causal potency of an idea, or an ideal, becomes just as real as that of a molecule, a cell, or a nerve impulse. Ideas cause ideas and help evolve new ideas. They interact with each other and with other mental forces in the same brain, in neighboring brains, and in distant, foreign brains. And they also interact with real consequence upon the external surroundings to produce in toto an explosive advance in evolution on this globe far

beyond anything known before, including the emergence of the living cell.

Problems of complexity and adequate technology aside, there would seem to be no great obstacle to the eventual objective, scientific treatment of mental phenomena. Statements in the literature discourage the hope that the mind is capable of explaining itself in terms of its own ideas. The argument is that no machine, living or otherwise, can logically embody within itself a complete description of itself. But underline that word "complete," and then consider the extent of the explanatory possibilities that still remain. Also underline "itself" and remember that this logic does not prevent a man's mind from acquiring a complete description of his neighbor's mind nor from passing on this description to other neighbors, excepting only the one being described.

Looking back at this point, one may see that the earlier dichotomy between mentalism and materialism is resolved in this interpretation. The former polar differences with respect to human values, when recast in the present scheme, become mainly errors of reductionism. For a theory of mind the new twist here, if any, lies in the attempt to make the emergent properties of inner experience conform to the brain code rather than isomorphs of the outside world—combined, of course, with the critical interjection of these mental qualities into the causal sequence.

The present scheme would put the conscious mind back into the brain of objective science and in a position of top command. It would eliminate the old dualistic confusions, dichotomies, and paradoxes, proposing instead a single unified system extending from subnuclear forces near the bottom up through ideas at the top. It would provide a long-sought unifying view on which to base our conception of human nature. Moreover it suggests a possible answer not only for the relation between mind and brain but also for that between the outside world and its inner cerebral representation. As for the older materialist-behaviorist movement, it may be said in retrospect that the denial or downgrading of conscious mental forces in objective experimental psychology during the past half-century has had value as a tactical expedient for a developing science and remains appropriate for much analytic research aimed at lower levels of brain function. It is hardly something, however, on which to build societal philosophy and cultural values.

• *FREE WILL*

Another serious threat to cherished images of human nature is the scientific rejection of free will. Every advance in the science of behavior, whether it comes from implanted electrodes, psychomimetic drugs, the psychiatrist's couch, brain surgery, imprinting, or Skinner boxes, seems only to reinforce the old suspicion that free will is merely an illusion. The more we learn about the brain and behavior, the more deterministic, lawful, and causal it appears. Like most others in brain research, I assume that every apparently free mental choice must in fact have been causally predetermined in the preceding brain states and related events. This means that any decision any of us has ever made could not possibly have had any other outcome in the given situation. Attempts to restore free will to the human brain by recourse to various forms of indeterminacy—physical, logical, emergent, or others—have failed, so far as I can see, to do much more than perhaps introduce a bit of unpredictable caprice into our comportment that most of us would prefer to be without. Neither science nor philosophy seems able as yet to find in the brain any satisfying exceptions to the classical onward flow of causal determinism.

Before we become overly disturbed by all this, however, there are a few more points we should keep in mind. These add up to the conclusion that if we were given freedom of choice in this whole matter, we might well prefer not to have it; that is, we would probably prefer to leave determinism in control exactly as science postulates. It should be clear that the kind of determinism proposed is not that of the atomic, molecular, or cellular level, but rather the kind that prevails at the level of cerebral mentation, involving the interplay of ideas, reasoning processes, judgment, emotion, insight, and so forth.

The proposed brain model provides in large measure the mental forces and abilities to determine one's own actions. It provides a high degree of freedom from outside forces as well as mastery over the inner molecular and atomic forces. In other words it provides plenty of free will provided we think of free will as self-determination. A person does indeed determine with his own mind what he is going to do and often from among a large series of alternative possibilities.

This does not mean, however, that there are cerebral operations that occur without antecedent cause. Man is not free from the higher forces in his own decision-making machinery. In particular, our model does not free a person from the combined effects of his own thought, his own impulses, his own reasoning, feeling, beliefs, ideals, and hopes, nor does it free him from his inherited makeup or his lifetime memories. All these and more, including unconscious desires, exert their due causal influence upon any mental decision, and the combined resultant determines an inevitable but nevertheless self-determined, highly special, and highly personal outcome. Thus the question: Do we really want free will, in the indeterministic sense, if it means gaining freedom from our own minds?

There may be worse fates, perhaps, than causal determinism. Maybe after all it is better to be an integral part of the causal flow of cosmic forces than to be out of contact with these—free-floating, as it were, with behavioral possibilities that have no antecedent cause, and

hence no reason nor any reliability relative to future plans, predictions, or promises. If one were assigned the task of trying to design and build the perfect free-will model, consider the possibility that the aim might be not so much to free the machinery from causal contact as the opposite, that is, to try to incorporate into the model the potential value of universal causal contact. In other words, contact with all related information in proper proportion—past, present, and future.

At any rate it is clear that the human brain has come a long way in evolution in exactly this direction, when you consider the amount and the kind of causal factors that this multidimensional, intracranial vortex draws into itself, scans, and brings to bear in turning out one of its preordained decisions; potentially included, through memory, are the events and wisdom of most of a human lifetime. Potentially included, also, with a visit to the library, is the accumulated knowledge of all recorded history. And we can add, thanks to reason and logic, much of the forecast and predictive value extractable from all these data as well as creative insights newly conceived. Maybe the total falls a bit short of universal causal contact; maybe it is not even up to the kind of thing evolution has going for it over on galaxy nine; and maybe, in spite of all, any decision that comes out is still predetermined. Nevertheless it certainly represents a very long jump in the direction of freedom from the primeval slime mold, the Pleistocene sand dollar, or even the latest model orangutan.

It will be evident that our current view does not deny the animalistic in human nature—any more than it denies the molecular or atomistic. It does deny, however, that the higher human properties in the mind and nature of man are the same as, or are reducible to, the components from which they are fashioned. On the debit side, there is little in our proposed model for consciousness to bolster one's hopes either for extrasensory perception or for postmortem perception. Similarly prepartum perception in the embryo would presumably be negligible until after the requisite cerebral machinery for conscious awareness begins to attain functional maturity in the later months of fetal life, and in subsequent postnatal development.

• *PLASTICITY OF HUMAN NATURE AND INHERITANCE OF BEHAVIOR TRAITS*

Finally, in connection with development, I should mention briefly certain other advances in the brain-behavior sciences that have resulted in important revisions in our general conception of human nature. These concern the extent to which behavior traits can be inherited and the extent to which human nature is plastic and subject to shaping by experience and environment.

The objective, materialist movement in psychology, established first in the Soviet Union partly under Pavlov, and pioneered in this country by Watson as behaviorism, has been identified almost as much with the promotion of the conditioned response as it has with the demotion of consciousness. Personality and behavior generally were attributed to a life-long chain of conditioned reflex associations. The whole idea of the genetic inheritance of behavior patterns was renounced until the term "instinct" became highly discredited in behavioral science. The embryonic growth of brain pathways was believed to be by nature nonselective and diffuse. Specific anatomical hook-ups in the brain were held to be unimportant anyway for orderly function, and subject to radical, wholesale disarrangements by surgery, injury, and regeneration without causing much functional disturbance. In the scientific thinking of those times the brain was endowed with an almost mysteriously omnipotent plasticity and readaptation capacity. In general, science seemed to be telling us as late as the early forties that the human brain and human nature in general are extreme in their malleability. It seemed at that time a scientifically sound conclusion that it would be possible, through an appropriate program of training and environmental conditioning, to shape human nature and hence society within wide limits into a desired mold.

Much of the basic scientific thinking and evidence behind these views has since suffered a series of severe upsets leading to current stands on these same matters that are almost diametrically opposed to the earlier doctrines. Instead of a loose, universal plasticity in brain hook-ups we see today a basic built-in wiring diagram that is characteristic of the species and functionally rather rigid. Instead of diffuse nonselective growth of nerve connections in brain development, we see now a very precise and highly ordered patterning of brain fiber pathways and connections—all strictly preregulated through cytochemical affinities under genetic control. Where there used to be an outright denunciation of the whole instinct concept, we now accept the idea that an entire evolutionary tree can be set up on the basis of inherited behavior patterns. The conditioned response, along with other forms of learning, continues to be recognized as a highly powerful modeling influence, and especially so in man, but only within limits that are much narrower than previously believed.

Within the specialized fields of scientific inquiry involved here the pendulum of opinion continues to swing, at this date, in the direction of inheritance. How far it will go can only be guessed. It is still too soon for the implications of these changes to have fully permeated even the neighboring scientific disciplines. In any case, to return to our central theme here: it would seem that the evidence available today demands that we renounce, along with other aspects of the behaviorist-materialist approach, the old "Pavlovian-Watsonian conditioned reflex theory of the psyche" with its radical environmentalism that used to tell us, literally, that 99 per cent of human nature and mind is a product of experience, environment, and training.